

passed in a northeasterly direction over Nippon, and disappeared in the ocean on the 19th, followed by strong northwesterly gales in the sw. quadrant.

XXXI.—On the 24th, the s. s. "City of Tokio," in N. 35° 33', E. 146° 45', reported barometer 29.46 (748.3), wind wsw., force 8, weather cloudy. The reports of the 25th, 26th, and 27th, from the above-named vessel indicate that the depression passed northeastward over the Pacific as a somewhat severe storm, being accompanied by strong wind of force 6-8.

XXXII.—This disturbance appeared in Nippon on the 28th, attended by cloudy weather and rain. During the 29th and 30th, the pressure remained low over Japan, but on the last day of the month, it began to increase, and the weather cleared.

This month, like the preceding, was marked by the continued presence of barometric minima over Japan, while high-pressures prevailed almost without interruption throughout the month, in China.

### TEMPERATURE OF THE AIR.

The distribution of mean temperature, over the United States and Canada, for the month of December, 1882, is exhibited on chart ii., by the dotted isothermal lines. The table of comparative mean temperatures in the lower left-hand corner of the chart, shows the average temperature for the month in the

several districts, as determined from observations taken at the Signal Service stations during the month of December in previous years.

The month of December, 1882, has been colder than the average for December in the Southern, middle, and New England states, and in the regions east of the Missouri valley. It has averaged about 3° below the mean in the Southern states east of the Mississippi river, and over 1° below the average in New England, the middle states, the lower lake region, the Ohio and upper Mississippi valleys. At the Rocky mountain stations and thence westward to the Pacific coast the temperature has been above the mean for the month, the warmest weather being reported from Colorado, Nevada, Wyoming, and on the north Pacific coast, where it averaged from 3° to 5° above the mean for the month. In California and Arizona, the temperature averaged about 1° above the mean. The average temperature on the summits of Mount Washington and Pike's Peak was slightly above the mean for the month.

### DEVIATIONS FROM MEAN TEMPERATURE.

The departures exhibited by the reports from the regular Signal Service stations are shown in the table of comparative temperature on the left-hand of chart ii.

The Chief Signal Officer is indebted to voluntary observers

Table of Comparative Minimum Temperatures for the Month of December.

| State or Territory. | Minimum for December, 1882, Signal Service. |       | Lowest since Signal Service stations were opened—3 to 11 years. |       |            | Lowest from any other source. |       |          |                   |
|---------------------|---|-------|---|-------|------------|-------------------------------|-------|----------|-------------------|
|                     | Station.                                    | Temp. | Station.  | Temp. | Year.      | Place.                        | Temp. | Year.    | Length of Record. |
| Alabama             | Montgomery                                  | 19    | Montgomery  | 8     | 1880       | Huntsville                    | 7     |          | 9 years           |
| Do                  |   |       |   |       |            | Thomas Barracks               | 10    | 1875     | 2 "               |
| Arizona             | Prescott                                    | 10    | Prescott  | -18   | 1879       | Fort Canby                    | -25   |          | 12 "              |
| Arkansas            | Fort Smith                                  | 10    | Little Rock   | 6     | 1880       | Washington, near              | -6    | 1845     | 27 "              |
| Do                  |   |       |   |       |            | Fort Smith                    | 0     |          | 21 "              |
| California          | Red Bluff                                   | 25    | Campo   | 7     | 1878       | Fort Jones                    | -17   | '55, '57 | 5 "               |
| Do                  |   |       |   |       |            | Camp Bidwell                  | -10   |          | 15 "              |
| Colorado            | Pike's Peak                                 | -15   | Pike's Peak   | -37   | 1878       | Fort Garland                  | -30   |          | 39 "              |
| Do                  |   |       |   |       |            | Fort Lyon                     | -30   | 1876     | 20 "              |
| Connecticut         | New Haven                                   | 4     | New Haven   | -4    | 1880       | Middletown                    | -18   | 1860     | 11 "              |
| Dakota              | Tobacco Garden                              | -35   | Femina  | -49   | 1878       | Fort Stevenson                | -54   | 1879     | 7 "               |
| Do                  |   |       | Fort Buford and Stevenson                                       | -46   | 1879       | Fort Totten                   | -61   | 1879     | 7 "               |
| Delaware            | Delaware Breakwater                         | 14    | Delaware Breakwater   | 1     | 1880       | Fort Delaware                 | 8     |          | 44 "              |
| Do                  |   |       |   |       |            | Dover                         | 8     | 1876     | 6 "               |
| Dist. of Columbia   | Washington                                  | 8     | Washington  | -13   | 1880       | Washington                    | -10   |          | 48 "              |
| Florida             | Pensacola                                   | 25    | Pensacola   | 7     | 1880       | Fort Barrancas                | 16    |          | 52 "              |
| Georgia             | Atlanta                                     | 12    | Atlanta   | 7     | 1880       | McPherson Barracks            | -1    | 1880     | 7 "               |
| Idaho               | Eagle Rock                                  | -25   | Lewiston  | -16   | 1879       | Fort Hall                     | -30   | 1879     | 10 "              |
| Illinois            | Champaign                                   | -14   | Chicago   | -15   | 1880       | Rock Island Arsenal           | -28   | 1872     | 14 "              |
| Indiana             | Indianapolis                                | -10   | Indianapolis  | -15   | 1876       | Wabash                        | -19   | 1850     | 6 "               |
| Indian Territory    | Fort Supply                                 | 5     | Fort Gibson   | 9     | 1876       | Fort Sill                     | -11   | 1872     | 10 "              |
| Iowa                | Des Moines                                  | -17   | Dubuque   | -19   | 76, 79, 80 | Cresco                        | -35   | 1879     | 8 "               |
| Kansas              | Leavenworth                                 | -5    | Dodge City  | -15   | 1876       | Fort Wallace                  | -24   | 1876     | 8 "               |
| Kentucky            | Louisville                                  | 4     | Louisville  | -7    | 1880       | Newport Barracks              | -8    |          | 28 "              |
| Louisiana           | Shreveport                                  | 22    | Shreveport  | -10   | 1880       | Okaloosa                      | 10    | 1880     | 3 "               |
| Do                  |   |       |   |       |            | Fort Jessup                   | 14    |          | 22 "              |
| Maine               | Eastport                                    | 5     | Eastport  | -20   | 1875       | Gardiner                      | -24   |          | 45 "              |
| Maryland            | Baltimore                                   | 10    | Baltimore   | -3    | 1880       | Emmitsburg                    | -19   | 1880     | 7 "               |
| Massachusetts       | Boston                                      | 6     | Boston  | -11   | 1875       | Billica                       | -20   | 1876     | 8 "               |
| Do                  |   |       |   |       |            | New Bedford                   | -10   | 1860     | 60 "              |
| Michigan            | Escanaba                                    | -12   | Escanaba  | -25   | 1880       | Fort Brady                    | -41   | 1872     | 58 "              |
| Minnesota           | Saint Vincent                               | -30   | Saint Vincent   | -42   | 1880       | Fort Ripley                   | -40   |          | 14 "              |
| Mississippi         | Starkville                                  | 13    | Vicksburg   | 12    | 1880       | Fayette                       | 11    | 1880     | 8 "               |
| Missouri            | Saint Louis                                 | -6    | Saint Louis   | -15   | 1880       | Holla, near                   | -23   | 1870     | 7 "               |
| Montana             | New Chicago                                 | -34   | Fort Benton   | -39   | 1880       | Camp Baker                    | -53   | 1871     | 9 "               |
| Do                  |   |       |   |       |            | Fort Benton                   | -54   | 1880     | 14 "              |
| Nebraska            | Omaha                                       | -15   | North Platte  | -27   | 1879       | Sydney Barracks               | -37   | 1879     | 5 "               |
| Do                  |   |       |   |       |            | Glendale                      | -30   | 1868     | 2 "               |
| Nevada              | Winnemucca                                  | -4    | Winnemucca  | -20   | 1879       | Fort Halleck                  | -22   | 1879     | 12 "              |
| New Hampshire       | Mount Washington                            | -25   | Mount Washington  | -47   | 1876       | Dartmouth College             | -29   |          | 18 "              |
| Do                  |   |       |   |       |            | Stratford                     | -24   |          | 11 "              |
| New Jersey          | Sandy Hook                                  | 3     | Atlantic City   | -7    | 1880       | Linden                        | -18   | 1880     | 6 "               |
| Do                  |   |       | Barneget  | -7    | 1880       |                               |       |          |                   |
| New Mexico          | Santa Fé                                    | -1    | Santa Fé  | -13   | 1879       | Fort Union                    | -28   | 1855     | 30 "              |
| New York            | Oswego                                      | 3     | Albany  | -17   | 1875       | Madison Barracks              | -44   | 1871     | 54 "              |
| North Carolina      | Charlotte                                   | 10    | Charlotte   | -5    | 1880       | Lenoir                        | -16   | 1880     | 3 "               |
| Do                  |   |       |   |       |            | Fort Johnson                  | 9     |          | 54 "              |
| Ohio                | Cleveland                                   | -9    | Sandusky  | -13   | 1880       | Kenton                        | -20   | 1876     | 3 "               |
| Do                  |   |       |   |       |            | College Hill                  | -12   | 1880     | 65 "              |
| Oregon              | Umatilla                                    | 6     | Portland  | 3     | 1879       | Eola                          | -8    | 1879     | 7 "               |
| Pennsylvania        | Pittsburg                                   | -1.5  | Erle  | -11   | 1880       | Lewisburg                     | -23   | '67, '67 | 6 "               |
| Rhode Island        | Narragansett Pier                           | 5     | Newport   | -3    | 1875       | Providence                    | -12   |          | 36 "              |
| South Carolina      | Charleston                                  | 24    | Charleston  | 13    | 1880       | Aiken                         | 3     | 1880     | 7 "               |
| Do                  |   |       |   |       |            | Charleston                    | 20    | 1861     | 104 "             |
| Tennessee           | Knoxville                                   | 5     | Knoxville   | -5    | 1880       | Clarksville                   | -4    | 1880     | 8 "               |
| Texas               | Fort Elliott                                | 1     | Fort Elliott  | -10   | 1879       | Camp Stockton                 | -9    | 1859     | 15 "              |
| Utah                | Salt Lake City                              | 12    | Salt Lake City  | -10   | 1879       | Fort Crittenden               | -22   | 1859     | 3 "               |
| Vermont             | Burlington                                  | -19   | Burlington  | -19   | 1879       | Lunenburg                     | -30   | 1868     | 20 "              |
| Virginia            | Lynchburg                                   | 8     | Fort Whipple  | -11   | 1880       | Dover                         | -34   | 1880     | 2 "               |
| Do                  |   |       |   |       |            | Fort Monroe                   | 17    |          | 56 "              |
| Washington          | Colfax                                      | -5    | Olympia   | -17   | 1879       | Fort Colville                 | -22   | 1861     | 21 "              |
| Do                  |   |       |   |       |            | Fort Townsend                 | -22   | 1873     | 23 "              |
| West Virginia       | Morgantown                                  | 3     | Morgantown  | -9    | 1880       | Flemington                    | -21   | 1880     | 3 "               |
| Wisconsin           | La Crosse                                   | -20   | La Crosse   | -26   | 1879       | Fort Howard                   | -38   |          | 31 "              |
| Wyoming             | Fort Washakie                               | -27   | Cheyenne  | -24   | '79-'80    | Fort Fetterman                | -36   | 1872     | 14 "              |

for the following interesting items bearing upon this subject. These comparisons are of special importance, as many of the records from which they are made cover long periods of time, some extending back many years before the establishment of the Signal Service:

**Illinois.**—Riley, mean temperature,  $19^{\circ}.4$ , or  $1^{\circ}.4$  below the December average of the last twenty-one years. The mean temperature of the year 1882 is  $45^{\circ}.7$ , or  $0^{\circ}.8$  above the annual mean of nineteen years. The maximum temperature of the year,  $89^{\circ}$ , occurred June 22d; minimum,  $-14^{\circ}$ , occurred December 7th.

Anna, mean temperature,  $35^{\circ}.16$ , is  $1^{\circ}.59$  below the average of a period of seven years.

**Indiana.**—Logansport, mean temperature,  $28^{\circ}.8$ , is  $1^{\circ}.5$  above the December average since 1860. During that period the highest December mean,  $45^{\circ}$ , occurred in 1877; the lowest,  $14^{\circ}$ , occurred in 1872.

Vevay, mean temperature,  $33^{\circ}.9$ , corresponds with the December normal.

The following table, furnished by Dr. T. C. Hunter, of Wabash, Indiana, shows the monthly and annual mean temperatures at that place for the six years, ending December 31, 1882:

| Month.            | 1877. | 1878. | 1879. | 1880. | 1881. | 1882. | Monthly means. |
|-------------------|-------|-------|-------|-------|-------|-------|----------------|
| January.....      | 21.00 | 30.33 | 23.25 | 40.00 | 20.00 | 29.62 | 27.37          |
| February.....     | 37.00 | 33.33 | 25.67 | 35.40 | 27.18 | 38.47 | 35.68          |
| March.....        | 50.00 | 45.67 | 37.50 | 38.10 | 34.93 | 43.05 | 38.20          |
| April.....        | 50.00 | 55.50 | 48.25 | 53.07 | 45.62 | 51.64 | 50.76          |
| May.....          | 59.10 | 57.67 | 61.00 | 66.46 | 69.83 | 58.74 | 63.12          |
| June.....         | 67.75 | 65.00 | 67.00 | 74.40 | 73.13 | 70.58 | 69.64          |
| July.....         | 71.50 | 79.00 | 72.53 | 76.32 | 78.12 | 70.94 | 74.68          |
| August.....       | 70.50 | 71.00 | 71.00 | 72.89 | 78.86 | 72.86 | 72.77          |
| September.....    | 60.33 | 65.00 | 59.25 | 63.60 | 73.64 | 60.87 | 63.78          |
| October.....      | 55.33 | 51.67 | 60.00 | 49.16 | 58.67 | 56.63 | 55.22          |
| November.....     | 39.00 | 41.50 | 41.60 | 28.19 | 46.10 | 40.23 | 39.52          |
| December.....     | 42.00 | 22.50 | 30.67 | 21.61 | 37.78 | 27.79 | 30.49          |
| Annual means..... | 50.28 | 51.51 | 49.83 | 51.67 | 53.69 | 51.74 | 51.85          |

It will be seen from the above table that the mean temperature of December, 1882, is  $2^{\circ}.7$  below the average of December during the period covered by the record.

**Iowa.**—Iowa City, the following extract is taken from "Press Bulletin," number 116, for December, 1882, published by Dr. Gustavus Hinrichs, director of the Iowa Weather Service:

"The mean temperature of the air was nearly three degrees below the normal. The first half of the month was very cold and fair; the last half was nearly normal but very cloudy. The coldest days were the 6th, 7th, and 8th, averaging thirty degrees below the normal; the 20th and 21st were the warmest, the mean temperature being fourteen degrees above the normal, causing a general thaw and break up in rivers."

Clinton, mean temperature,  $21^{\circ}.3$ , is  $7^{\circ}$  below the December normal.

**Kansas.**—Wellington, mean temperature,  $30^{\circ}.02$ , is  $0^{\circ}.7$  below the December average of the last three years. The mean temperature of the year of 1882 is  $53^{\circ}.8$  or  $1^{\circ}.2$  below the annual average of the last four years.

Yates Centre, mean temperature,  $29^{\circ}.65$ , is  $0^{\circ}.71$  above the December average of the last three years.

Lawrence, mean temperature,  $31^{\circ}.25$ , is  $1^{\circ}.76$  above the December average of the last fifteen years. The highest December mean temperature of that period,  $44^{\circ}.43$ , occurred in 1867; the lowest,  $19^{\circ}.93$ , occurred in 1872; the highest maximum tem-

perature,  $73^{\circ}$  occurred in 1875; lowest minimum temperature,  $-18^{\circ}$ , occurred in 1872. The following interesting table, taken from the annual summary prepared by Professor F. H. Snow, of the State University at Lawrence, shows the mean temperatures and annual extremes at that place since 1868:

| Year.     | Max. | Min.  | Mean. | Year.      | Max. | Min.  | Mean. |
|-----------|------|-------|-------|------------|------|-------|-------|
| 1868..... | 101  | -16.5 | 63.36 | 1876.....  | 98   | -5    | 52.76 |
| 1869..... | 96   | -5    | 50.89 | 1877.....  | 99   | -9    | 54.16 |
| 1870..... | 102  | -10   | 54.50 | 1878.....  | 98   | -6    | 55.33 |
| 1871..... | 103  | -6    | 54.30 | 1879.....  | 99.5 | -16   | 54.67 |
| 1872..... | 97   | -18   | 51.90 | 1880.....  | 101  | -8    | 54.01 |
| 1873..... | 104  | -28   | 52.71 | 1881.....  | 104  | -8    | 54.66 |
| 1874..... | 108  | -3    | 54.20 | 1882.....  | 105  | -6.5  | 54.94 |
| 1875..... | 90   | -16.5 | 50.60 |            |      |       |       |
|           |      |       |       | Means..... | 101  | -12.2 | 53.63 |

**Maine.**—Gardiner, mean temperature is  $20^{\circ}.31$ , or  $1^{\circ}.95$  below the December average of a period of forty-seven years.

**Maryland.**—Fallston, mean temperature,  $31^{\circ}.03$ , is  $2^{\circ}.03$  below the December average of the last thirteen years. The highest December mean of that period,  $40^{\circ}.25$ , occurred in 1877; the lowest,  $23^{\circ}.63$ , occurred in 1876.

**Missouri.**—Saint Louis, the Missouri Weather Service reports the mean temperature to be  $32^{\circ}.5$ , or  $0^{\circ}.7$  below the December normal. The first decade was about  $4^{\circ}$  colder, and the last decade about  $4^{\circ}$  warmer than the normal.

**New Hampshire.**—Grafton, mean temperature,  $20^{\circ}.3$ , is  $3^{\circ}.6$  below the December average of the four years from 1877 to 1880, inclusive.

**New York.**—Palermo, mean temperature,  $23^{\circ}.7$ , is  $0^{\circ}.7$  below the December average of the last twenty-nine years. The highest December mean temperature of that period,  $32^{\circ}.1$ , occurred in 1881; the lowest,  $16^{\circ}.8$ , occurred in 1880. The mean temperature of the year of 1882,  $43^{\circ}.3$ , is  $1^{\circ}$  below the annual average of twenty-nine years. During that period the highest annual mean,  $51^{\circ}.8$ , occurred in 1878; the lowest,  $43^{\circ}.2$ , occurred in 1882. The mean temperatures of the seasons of 1882 are: spring,  $40^{\circ}.7$ ; summer,  $65^{\circ}.7$ ; autumn,  $43^{\circ}.5$ ; winter,  $23^{\circ}.5$ . North Volney, mean temperature is  $45^{\circ}.46$ , which is the December normal of the last fifteen years. The highest December mean temperature,  $33^{\circ}.73$ , occurred in 1881; the lowest,  $18^{\circ}.02$ , occurred in 1876. The mean temperature of the year of 1882 is  $45^{\circ}.49$ , or  $0^{\circ}.09$  above the annual average of fourteen years. The highest annual mean of that period is  $47^{\circ}.74$  for 1878; the lowest,  $41^{\circ}.61$ , for 1875. The mean temperature of the year at 7.00 a. m. is  $42^{\circ}.15$ ; at 2.00 p. m.,  $52^{\circ}.68$ ; at 9.00 p. m.,  $43^{\circ}.57$ ; and the annual range  $112^{\circ}$ .

**Vermont.**—Woodstock, mean temperature,  $17^{\circ}.91$ , is  $1^{\circ}.59$  below the December average of a period of fifteen years. The highest December mean of that period is  $30^{\circ}.14$ , which occurred in 1881; and the lowest,  $8^{\circ}.62$ , occurred in 1872; the highest maximum temperature,  $62^{\circ}$ , occurred December 14, 1881; lowest minimum,  $-41^{\circ}.5$ , occurred December 25, 1872.

**Virginia.**—Variety Mills, mean temperature,  $52^{\circ}.3$ , is  $4^{\circ}.9$  below the December average of the last six years. The highest December mean of that period,  $43^{\circ}.3$ , occurred in 1879; the lowest,  $30^{\circ}.6$ , occurred in 1876.

The following table, furnished by Mr. C. R. Moore, of Snowville, shows the monthly and annual mean temperatures at that place since 1869:

| MONTH.         | 1869.  | 1870.  | 1871.  | 1872.  | 1873.  | 1874.  | 1875.  | 1876.  | 1877.  | 1878.  | 1879.  | 1880.  | 1881.  | 1882.  | Monthly means. |
|----------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|----------------|
| January.....   | 42.13  | 43.72  | 38.17  | 35.39  | 38.39  | 43.04  | 34.02  | 46.37  | 37.53  | 41.11  | 36.94  | 49.44  | 39.67  | 40.24  | 40.16          |
| February.....  | 43.33  | 39.72  | 41.84  | 39.66  | 38.23  | 41.28  | 34.78  | 42.77  | 43.04  | 44.17  | 37.44  | 47.77  | 38.36  | 46.72  | 41.29          |
| March.....     | 43.19  | 43.52  | 52.39  | 37.64  | 43.10  | 46.78  | 44.10  | 43.37  | 45.87  | 54.07  | 48.74  | 48.96  | 46.96  | 49.56  | 46.23          |
| April.....     | 54.14  | 52.90  | 59.34  | 54.85  | 53.72  | 49.57  | 49.38  | 55.09  | 55.37  | 60.95  | 55.56  | 61.59  | 53.42  | 55.00  | 54.94          |
| May.....       | 56.50  | 63.65  | 65.02  | 60.27  | 61.64  | 61.66  | 63.10  | 63.24  | 63.78  | 66.81  | 67.67  | 73.70  | 67.96  | 62.92  | 64.56          |
| June.....      | 73.77  | 74.28  | 73.00  | 72.96  | 72.75  | 74.88  | 70.16  | 74.27  | 76.45  | 72.78  | 74.49  | 77.73  | 74.73  | 76.42  | 74.19          |
| July.....      | 76.98  | 79.49  | 77.53  | 79.71  | 76.15  | 75.31  | 77.91  | 79.17  | 81.05  | 83.25  | 80.01  | 81.42  | 80.33  | 79.88  | 79.16          |
| August.....    | 74.87  | 77.65  | 74.91  | 78.35  | 76.07  | 72.05  | 74.19  | 76.50  | 80.10  | 80.13  | 77.77  | 77.83  | 77.91  | 78.75  | 76.93          |
| September..... | 69.65  | 71.00  | 65.97  | 64.57  | 68.68  | 57.10  | 68.67  | 69.13  | 61.22  | 74.62  | 71.07  | 73.49  | 79.75  | 74.49  | 70.03          |
| October.....   | 54.51  | 61.90  | 63.82  | 58.53  | 56.92  | 59.34  | 57.42  | 55.24  | 64.54  | 62.64  | 67.78  | 62.21  | 69.24  | 66.21  | 61.47          |
| November.....  | 43.43  | 50.00  | 47.07  | 45.30  | 46.73  | 49.35  | 46.16  | 49.02  | 53.90  | 51.92  | 52.90  | 46.55  | 55.55  | 48.72  | 48.93          |
| December.....  | 42.07  | 38.73  | 38.66  | 33.93  | 43.60  | 42.60  | 43.43  | 32.72  | 47.80  | 39.56  | 51.06  | 35.32  | 47.67  | 39.32  | 41.18          |
| Sums.....      | 675.87 | 698.56 | 697.72 | 667.16 | 674.97 | 686.26 | 661.32 | 684.89 | 710.63 | 732.08 | 720.73 | 736.01 | 724.55 | 718.85 | 699.07         |
| Means.....     | 56.16  | 58.21  | 58.14  | 55.59  | 56.25  | 57.19  | 55.11  | 57.07  | 59.22  | 61.00  | 60.06  | 61.33  | 60.38  | 59.85  | 58.26          |

**West Virginia.**—Helvetia, mean temperature,  $31^{\circ}.56$ , is  $1^{\circ}.35$  below the December average of six years. The mean temperature of the year 1882 is  $51^{\circ}.40$ , or  $0^{\circ}.90$  above the annual average of six years.

#### RANGES OF TEMPERATURE AT SIGNAL SERVICE STATIONS.

Monthly ranges of temperature during December, 1882, have varied from  $29^{\circ}$  at Portland, Oregon, and Key West, Florida, to  $82^{\circ}$  at Rapid City, Dakota;  $83^{\circ}$  at Fort Benton, Montana, and  $89^{\circ}$  at New Chicago, Montana. The smallest monthly ranges are: Portland, Oregon, and Key West, Florida,  $29^{\circ}$ ; San Francisco, California,  $30^{\circ}$ ; Mackinac City, Michigan, and Williamsport, Pennsylvania,  $31^{\circ}$ ; Oswego, New York,  $35^{\circ}$ . The largest are: New Chicago, Montana,  $89^{\circ}$ ; Fort Benton, Montana,  $83^{\circ}$ ; Rapid City, Dakota,  $82^{\circ}$ ; Fort Washakie, Wyoming,  $79^{\circ}$ ; Eagle Rock, Idaho,  $76^{\circ}$ ; Fort Bennett, Dakota,  $76^{\circ}$ ; West Las Animas, Colorado,  $76^{\circ}$ ; Fort Assiniboine, Montana,  $75^{\circ}$ ; Cheyenne, Wyoming,  $74^{\circ}$ ; Fort Elliott, Texas,  $74^{\circ}$ ; Glendive, Montana,  $72^{\circ}$ ; Omaha, Nebraska,  $72^{\circ}$ ; Yankton, Dakota,  $72^{\circ}$ ; Phoenix, Arizona,  $71^{\circ}$ ; Cartersville, Montana,  $70^{\circ}$ ; Huron, Dakota,  $70^{\circ}$ ; North Platte, Nebraska,  $69^{\circ}$ ; Fort Stevenson, Dakota,  $69^{\circ}$ ; Helena and Terry's Landing, Montana,  $69^{\circ}$ ; Des Moines, Iowa,  $67^{\circ}$ ; Indianapolis, Indiana,  $67^{\circ}$ ; Saint Louis and Springfield, Missouri,  $66^{\circ}$ ; Denver, Colorado,  $66^{\circ}$ ; Fort Stockton, Texas,  $65^{\circ}$ ; Moorhead, Minnesota,  $55^{\circ}$ ; Davenport, Iowa,  $65^{\circ}$ . The greatest daily ranges have varied in the different districts as follows:

**New England.**—From  $25^{\circ}$ , at Springfield, Massachusetts, on the 3d, to  $42^{\circ}$  on the summit of Mount Washington on the 3d.

**Middle Atlantic states.**—From  $22^{\circ}$  at Williamsport, Pennsylvania, on the 7th, to  $37^{\circ}$  at Cape May, New Jersey, on the 6th, and at Norfolk, Virginia, on the 7th.

**South Atlantic states.**—From  $25^{\circ}$  at Fort Macon, North Carolina, on the 7th and 9th, and at Jacksonville, Florida, on the 4th, to  $39^{\circ}$  at Atlanta, Georgia, on the 7th.

**Florida Peninsula.**—From  $14^{\circ}$  at Key West, on the 16th, to  $24^{\circ}$  at Punta Rassa, on the 1st and 16th.

**East Gulf states.**—From  $26^{\circ}$  at New Orleans, Louisiana, to  $39^{\circ}$  at Starkville, Mississippi, on the 7th.

**West Gulf states.**—From  $21^{\circ}$  at Port Eads, Louisiana, on the 7th, and  $25^{\circ}$  at Little Rock, Arkansas, on the 7th and 17th, to  $39^{\circ}$  at Fort Smith, Arkansas, and San Antonio, Texas, on the 17th.

**Ohio valley and Tennessee.**—From  $24^{\circ}$  at Indianapolis, Indiana, on the 8th, and  $25^{\circ}$  at Louisville, Kentucky, on the 7th, to  $38^{\circ}$  at Columbus, Ohio, on the 7th.

**Lower lake region.**—From  $22^{\circ}$  at Sandusky, Ohio, on the 7th, to  $33^{\circ}$  at Cleveland, Ohio, on the 7th.

**Upper lake region.**—From  $19^{\circ}$  at Port Huron, Michigan, on the 9th, to  $34^{\circ}$  at Duluth, Minnesota, on the 17th.

**Extreme northwest.**—From  $32^{\circ}$  at Bismark, Dakota, on the 23d, and at Saint Vincent, Minnesota, on the 11th, to  $35^{\circ}$  at Moorhead, Minnesota, on the 8th.

**Upper Mississippi valley.**—From  $22^{\circ}$  at Cairo, Illinois, on the 6th and 11th, and  $23^{\circ}$  at La Crosse, Wisconsin, on the 6th, 8th, 11th and 16th, to  $32^{\circ}$  at Saint Paul, Minnesota, on the 8th, and at Des Moines, Iowa, on the 11th.

**Missouri valley.**—From  $34^{\circ}$  at Huron, Dakota, on the 26th, to  $42^{\circ}$  at Fort Bennett, Dakota, on the 1st.

**Northern slope.**—From  $32^{\circ}$  at Helena, Montana, on the 14th, and  $33^{\circ}$  at Fort Custer, Montana, on the 15th, to  $47^{\circ}$  at Fort Benton, Montana, on the 15th, and  $48^{\circ}$  at Cheyenne, Wyoming, on the 7th.

**Middle slope.**—From  $28^{\circ}$  at Pike's Peak, Colorado, on the 9th, to  $48^{\circ}$  at Fort Elliott, Texas, on the 17th, and  $58^{\circ}$  at West Las Animas, Colorado, on the 8th.

**Southern slope.**—From  $33^{\circ}$  at Jacksborough, Texas, on the 6th, to  $44^{\circ}$  at Coleman City, Texas, on the 18th.

**Southern plateau.**—From  $28^{\circ}$  at Fort Grant, Arizona, on the 29th, and  $29^{\circ}$  at Santa Fé, New Mexico, on the 7th, to  $50^{\circ}$  at Fort Apache, Arizona, on the 14th.

**Middle plateau.**—From  $20^{\circ}$  at Salt Lake City, Utah, on the 4th, to  $40^{\circ}$  at Fort Washakie, Wyoming, on the 8th.

Table of Maximum and Minimum Temperatures for December, 1882.

| State or Territory.       | Signal Service.        |      |      | U. S. Army Post Surgeons, or Voluntary Observers. |      |      |
|---------------------------|------------------------|------|------|---|------|------|
|                           | Station.               | Max. | Min. | Station.  | Max. | Min. |
| Alabama.....              | Mobile.....            | 74   | 24   | Mount Vernon Barracks.....                        | 78   | 20   |
| Do.....                   | Montgomery.....        | 70   | 19   | Auburn.....                                       | 67   | 14   |
| Arizona.....              | Phoenix.....           | 96   | 24   | Fort Lowell.....                                  | 82   | 9    |
| Do.....                   | Prescott.....          | 68   | 10   |   |      |      |
| Arkansas.....             | Little Rock.....       | 67   | 17   | Mount Ida.....                                    | 66   | 14   |
| Do.....                   | Fort Smith.....        | 66   | 10   |   |      |      |
| California.....           | Los Angeles.....       | 82   | 35   | Anaheim.....                                      | 92   | 40   |
| Do.....                   | Red Bluff.....         | 74   | 25   | Fort Bidwell.....                                 | 70   | 1    |
| Colorado.....             | West Las Animas.....   | 69   | 6    | Fort Lyon.....                                    | 69   | 7    |
| Do.....                   | Pike's Peak.....       | 27   | -16  | Pagosa Springs.....                               | 54   | -21  |
| Connecticut.....          | New London.....        | 63   | 7    |   |      |      |
| Do.....                   | New Haven.....         | 62   | 4    | Fort Randall.....                                 | 59   | -20  |
| Dakota.....               | Fort Bennett.....      | 67   | -19  | Fort Yates.....                                   | 63   | -24  |
| Do.....                   | Rapid City.....        | 57   | -25  |   |      |      |
| Do.....                   | Tobacco Garden.....    | 27   | -35  |   |      |      |
| Delaware.....             | Del. Breakwater.....   | 55   | 14   |   |      |      |
| District of Columbia..... | Washington.....        | 54   | 8    | Fort Barrancas.....                               | 79   | 15   |
| Florida.....              | Key West.....          | 81   | 52   | Forsyth.....                                      | 68   | 18   |
| Do.....                   | Pensacola.....         | 71   | 25   | Quitman.....                                      | 74   | 22   |
| Georgia.....              | Savannah.....          | 72   | 26   |   |      |      |
| Do.....                   | Atlanta.....           | 64   | 12   | Irrington.....                                    | 57   | -10  |
| Idaho.....                | Boise City.....        | 58   | 4    | Miami.....  | 57   | -11  |
| Do.....                   | Eagle Rock.....        | 50   | -26  | Rushville.....                                    | 46   | -17  |
| Indiana.....              | Indianapolis.....      | 57   | -10  | Lafayette.....                                    | 44   | -17  |
| Do.....                   |                        |      |      | Bunker Hill.....                                  | 56   | -11  |
| Do.....                   |                        |      |      | Elmira.....                                       | 43   | -18  |
| Illinois.....             | Chicago.....           | 56   | 4    |   |      |      |
| Do.....                   | Champaign.....         | 49   | -14  | Logan.....  | 54   | -16  |
| Indian Territory.....     | Fort Supply.....       | 69   | 6    | Cresco.....                                       | 38   | -23  |
| Do.....                   | Fort Sill.....         | 66   | 0    | Clay Centre.....                                  | 68   | -14  |
| Iowa.....                 | Keokuk.....            | 62   | -10  | Frankfort.....                                    | 51   | 0    |
| Do.....                   | Des Moines.....        | 50   | -17  | Point Pleasant.....                               | 75   | 19   |
| Kansas.....               | Leavenworth.....       | 59   | 6    |   |      |      |
| Kentucky.....             | Louisville.....        | 58   | 4    | Orono.....  | 47   | -12  |
| Louisiana.....            | New Orleans.....       | 76   | 30   | Gardiner.....                                     | 45   | 9    |
| Do.....                   | Shreveport.....        | 72   | 22   | Emmitsburg.....                                   | 50   | 2    |
| Maine.....                | Eastport.....          | 49   | 5    | Cumberland.....                                   | 48   | 4    |
| Do.....                   | Portland.....          | 49   | 9    | Williamstown.....                                 | 43   | 6    |
| Maryland.....             | Baltimore.....         | 51   | 10   | Rowe.....   | 46   | 8    |
| Massachusetts.....        | Boston.....            | 54   | 6    |   |      |      |
| Do.....                   | Provincetown.....      | 54   | 16   | Northfield.....                                   | 35   | -16  |
| Michigan.....             | Detroit.....           | 60   | 2    | Fort Snelling.....                                | 34   | -23  |
| Do.....                   | Escanaba.....          | 41   | -12  | Fayette.....                                      | 70   | 20   |
| Minnesota.....            | Saint Vincent.....     | 27   | -30  |   |      |      |
| Do.....                   | Moorhead.....          | 36   | -29  | Protem.....                                       | 68   | 5    |
| Mississippi.....          | Vicksburg.....         | 70   | 19   | Oregon.....                                       | 61   | -16  |
| Do.....                   | Starkville.....        | 68   | 13   | Sedalia.....                                      | 62   | -13  |
| Missouri.....             | Springfield.....       | 62   | 4    |   |      |      |
| Do.....                   | Saint Louis.....       | 60   | 6    | Fort Niobrara.....                                | 57   | -21  |
| Montana.....              | Fort Benton.....       | 57   | -26  | Golconda.....                                     | 73   | 3    |
| Do.....                   | Fort Shaw.....         | 57   | -17  | Halleck.....                                      | 60   | -28  |
| Do.....                   | New Chicago.....       | 55   | -34  | New Market.....                                   | 53   | 1    |
| Nebraska.....             | North Platte.....      | 67   | 7    | Grafton.....                                      | 41   | 6    |
| Do.....                   | Omaha.....             | 57   | -15  | New Brunswick.....                                | 47   | 2    |
| Nevada.....               | Winnemucca.....        | 60   | 4    |   |      |      |
| New Hampshire.....        | Mt. Washington.....    | 32   | -25  | Fort Union.....                                   | 66   | -10  |
| Do.....                   |                        |      |      | Johnstown.....                                    | 42   | -16  |
| New Jersey.....           | Cape May.....          | 60   | 14   | Madison Barracks.....                             | 42   | 8    |
| Do.....                   | Sandy Hook.....        | 63   | 3    | Friendship.....                                   | 42   | 6    |
| New Mexico.....           | Fort Bayard.....       | 75   | 11   | Ore Knob.....                                     | 55   | 6    |
| Do.....                   | Santa Fé.....          | 55   | 1    | Highlands.....                                    | 49   | 3    |
| New York.....             | New York City.....     | 54   | 11   | Portsmouth.....                                   | 64   | 0    |
| Do.....                   | Oswego.....            | 43   | 3    | Marion.....                                       | 58   | -10  |
| North Carolina.....       | Wilmington.....        | 68   | 17   | Ruggles.....                                      | 44   | -10  |
| Do.....                   | Charlotte.....         | 60   | 10   | Albany.....                                       | 59   | 26   |
| Ohio.....                 | Cincinnati.....        | 55   | 1    | Fort Klamath.....                                 | 53   | 0    |
| Do.....                   | Cleveland.....         | 45   | -9   | Franklin.....                                     | 40   | -10  |
| Do.....                   |                        |      |      | Bloomington.....                                  | 46   | 9    |
| Oregon.....               | Umatilla.....          | 58   | 6    |   |      |      |
| Do.....                   |                        |      |      | Aiken.....  | 66   | 16   |
| Pennsylvania.....         | Philadelphia.....      | 54   | 14   | Murfreesboro.....                                 | 57   | 4    |
| Do.....                   | Pittsburg.....         | 50   | -1.5 |   |      |      |
| Rhode Island.....         | Narragansett Pier..... | 54   | 5    | Woodstock.....                                    | 42   | -24  |
| South Carolina.....       | Charleston.....        | 69   | 24   | Johnstown.....                                    | 61   | 14   |
| Tennessee.....            | Memphis.....           | 67   | 12   | Snowville.....                                    | 50   | 0    |
| Do.....                   | Knoxville.....         | 60   | 5    |   |      |      |
| Texas.....                | Uvalde.....            | 67   | 25   | Helvetia.....                                     | 58   | 8    |
| Do.....                   | Fort Elliott.....      | 75   | 1    | Evansville.....                                   | 51   | -13  |
| Utah.....                 | Salt Lake City.....    | 60   | 12   | Embarras.....                                     | 34   | -23  |
| Vermont.....              |                        |      |      | Fort Bridger.....                                 | 50   | -18  |
| Virginia.....             | Norfolk.....           | 59   | 16   | Fort Washakie.....                                | 50   | -35  |
| Do.....                   | Lynchburg.....         | 59   | 8    |   |      |      |
| Washington.....           | Almota.....            | 68   | 16   |   |      |      |
| Do.....                   | Colfax.....            | 50   | -5   |   |      |      |
| West Virginia.....        | Morgantown.....        | 52   | 3    |   |      |      |
| Wisconsin.....            | Milwaukee.....         | 36   | -13  |   |      |      |
| Do.....                   | La Crosse.....         | 39   | -20  |   |      |      |
| Wyoming.....              | Cheyenne.....          | 58   | -15  |   |      |      |
| Do.....                   | Fort Washakie.....     | 52   | -27  |   |      |      |

**Northern plateau.**—From  $18^{\circ}$  at Lewiston, Idaho, on the 16th, to  $36^{\circ}$  at Eagle Rock, Idaho, on the 31st.

**Middle Pacific coast region.**—From  $14^{\circ}$  at San Francisco, California, on the 3d and 4th, to  $30^{\circ}$  at Red Bluff, California, on the 4th.

**South Pacific coast region.**—From 26° at San Diego, California, on the 27th, to 39° Los Angeles, California, on the 15th.

## FROSTS.

In the various districts they were reported on the following dates:

**New England.**—1st to 5th, 7th to 31st.

**Middle Atlantic states.**—1st to 5th, 7th to 21st, 23d to 31st.

**South Atlantic states.**—1st to 5th, 7th to 12th, 14th, 16th to 21st, 24th, 25th, 27th, 28th, 30th, 31st.

**East Gulf states.**—1st to 4th, 8th, 9th, 11th, 12th, 16th, 17th, 18th, 23d to 31st.

**West Gulf states.**—1st, 2d, 3d, 6th, 7th, 8th, 10th, 11th, 13th, 14th, 16th, 17th, 18th, 21st to 31st.

**Rio Grande valley.**—1st, 2d, 8th, 11th, 13th, 16th, 17th, 23d, 28th, 29th, 30th.

**Tennessee.**—1st to 4th, 6th to 9th, 11th, 12th, 14th to 19th, 23d to 31st.

**Ohio valley.**—1st to 19th, 22d to 31st.

**Lower lake region.**—12th, 18th, 19th, 20th, 25th, 26th, 27th, 29th, 30th, 31st.

**Upper lake region.**—1st to 31st.

**Extreme northwest.**—1st to 31st.

**Upper Mississippi valley.**—1st to 31st.

**Missouri valley.**—1st, 2d, 3d, 6th, 7th, 8th, 10th to 19th, 22d to 31st.

**Northern slope.**—1st to 31st.

**Middle slope.**—1st to 8th, 10th to 19th, 21st, 22d, 23d, 25th, 27th to 31st.

**Southern slope.**—1st, 2d, 3d, 5th, 6th, 8th to 11th, 13th to 18th, 22d, 23d, 25th to 30th.

**Southern plateau.**—1st to 31st.

**Middle plateau.**—1st to 8th, 10th, 15th, 16th, 21st, 22d, 24th, 26th to 31st.

**Northern plateau.**—1st, 2d, 5th, 7th, 9th to 12th, 14th, 15th, 16th, 18th, 19th, 20th, 23d, 25th to 31st.

**North Pacific coast region.**—11th, 13th, 18th, 19th, 23d, 25th, 26th, 28th to 31st.

**Middle Pacific coast region.**—3d to 10th, 15th to 18th, 20th, 25th, 26th, 27th, 29th, 30th, 31st.

**South Pacific coast region.**—3d, 5th, 10th, 11th, 13th to 16th, 19th, 20th, 22d to 31st.

The occurrence of frosts has also been reported by the following stations not situated in the districts named above: Cedar Keys, Florida, 1st, 2d, 8th, 17th; Fort Brooke, Florida, 1st, 2d.

At New Orleans, on the 8th, considerable damage was done by the freeze, to the sugar-cane in some of the parishes.

At Mayport, Florida, the orange crop was injured by the freeze of the 17th.

## ICE.

The subject of the formation of ice in the northern sections, is considered elsewhere in the REVIEW, under the heading ICE IN RIVERS AND HARBORS. The following are exceptional cases of ice formation in the southern sections of the country.

**Alabama.**—Mobile, 1st, 8th, 9th, 17th, 30th; Auburn, 1st, 8th, 9th, 16th, 17th, 18th.

**Florida.**—Jacksonville, 8th, 17th, 18th; Pensacola, 8th; Mayport, 12th, 17th, 18th.

**Georgia.**—Atlanta, 7th, ice sufficiently thick to bear the weight of persons on the ponds in vicinity. Savannah, 1st, 8th; Augusta, 8th, 9th, 16th, 17th, 18th.

**Louisiana.**—New Orleans, 8th.

**North Carolina.**—Kittyhawk, 9th, bay frozen. Cape Lookout, 9th. Core Sound frozen for a distance of one hundred yards from the shore, with ice one-half inch in thickness.

**South Carolina.**—Charleston, 17th.

**Tennessee.**—Memphis, 1st, 3d, 7th, 8th, 15th; Chattanooga, 1st, 4th, 7th, 8th, 9th, 12th, 16th, 17th, 18th, 24th, 25th.

**Texas.**—Indianola, 8th, the water in the bay sufficiently cold to kill fish, numbers of which were picked up along the shore. Ice formed on the 8th and 16th. Palestine, 7th, 8th, 16th; Fredericksburg, 7th, 8th, 16th, 29th, 31st; Eagle Pass, 16th, 17th, 18th, 23d, 29th, 30th; Uvalde, 8th.

## PRECIPITATION.

(Expressed in inches and hundredths.)

The distribution of rainfall over the United States and Canada, as determined from observations taken at more than five hundred stations, is exhibited on chart iii. The table in the lower left-hand corner of this chart shows the average monthly rainfall, determined from the records of Signal Service stations, in the several districts; it shows also the excess or deficiency of precipitation as compared with the average of many years.

A very large excess of rainfall (6.86) is reported from the north Pacific coast region. In the northern plateau, northern slope, the lake region, south Atlantic states, and in Florida, excesses are reported varying from 0.06 to 0.45. In all the other districts, the rainfall is below the December average. The largest deficiencies are: Middle Pacific coast region, 4.14; Tennessee, 2.90; Ohio valley, 1.80; south Pacific coast region, 1.44; east Gulf states, 1.20.

## DEVIATIONS FROM AVERAGE PRECIPITATION.

The departures exhibited by the reports from the regular Signal Service stations are shown in the table of comparative temperatures on the left-hand of chart iii.

The Chief Signal Officer is indebted to voluntary observers for the following interesting items bearing upon this subject. These comparisons are of special importance, as many of the records from which they are made cover long periods, some extending back many years before the establishment of the Signal Service:

**Illinois.**—Biley, monthly precipitation, 2.00, is 0.07 above the December average of twenty-one years. The total precipitation for the year of 1882 is 35.36, or 1.46 above the annual average of twenty-one years.

**Indiana.**—Logansport, monthly precipitation, 3.14, is 0.70 above the December average since 1860. The depth of snowfall for December, 1882, is 13.30 inches, or 4.48 above the average for December. During December, 1862, no snow fell; the greatest depth of snow for December, 24.11 inches, fell in 1872. In 1876, no rain fell during December; the largest December precipitation, 5.99, occurred in 1881. Vevay, monthly precipitation, 2.85, is 1.38 below the December average.

The following tables showing the monthly and annual rainfalls with the monthly and annual averages; and the rainfall by seasons, from 1866 to 1882, at Laconia, Indiana, have been furnished by Mr. Adam Crozier, of that place:

Table showing Monthly and Annual Rainfall at Laconia, Indiana.

| Months.               | 1866. | 1867. | 1868. | 1869. | 1870. | 1871. | 1872. | 1873. | 1874. | 1875. | 1876. | 1877. | 1878. | 1879. | 1880. | 1881. | 1882. | Monthly averages. |
|-----------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------------------|
| January.....          | 4.47  | 1.89  | 4.75  | 3.38  | 6.89  | 2.59  | 0.93  | 3.05  | 2.36  | 1.83  | 10.10 | 3.65  | 3.55  | 2.89  | 4.55  | 2.58  | 6.88  | 3.83              |
| February.....         | 1.36  | 8.96  | 1.75  | 2.46  | 2.40  | 6.55  | 3.59  | 4.40  | 4.71  | 1.37  | 2.48  | 0.41  | 2.58  | 2.52  | 6.19  | 3.98  | 9.13  | 3.83              |
| March.....            | 7.63  | 5.95  | 4.64  | 4.74  | 3.81  | 7.32  | 1.83  | 2.56  | 5.69  | 6.33  | 6.18  | 3.95  | 4.41  | 4.94  | 4.80  | 3.51  | 4.52  | 4.86              |
| April.....            | 2.14  | 2.96  | 6.93  | 5.42  | 2.78  | 2.10  | 8.21  | 2.61  | 5.01  | 1.67  | 3.89  | 5.36  | 3.09  | 3.92  | 6.46  | 3.46  | 1.99  | 3.95              |
| May.....              | 1.22  | 3.61  | 8.08  | 3.30  | 6.50  | 5.33  | 3.68  | 5.68  | 2.10  | 3.73  | 1.24  | 2.12  | 3.29  | 1.28  | 2.78  | 3.45  | 7.86  | 3.64              |
| June.....             | 5.02  | 2.85  | 2.78  | 2.94  | 2.06  | 1.43  | 2.46  | 5.06  | 0.98  | 8.60  | 7.67  | 5.31  | 3.96  | 1.20  | 3.22  | 7.19  | 5.75  | 4.02              |
| July.....             | 2.79  | 6.37  | 3.74  | 3.32  | 3.80  | 3.23  | 3.39  | 5.66  | 1.65  | 9.97  | 4.18  | 4.26  | 3.07  | 1.18  | 4.00  | 1.81  | 5.57  | 3.94              |
| August.....           | 3.57  | 1.11  | 3.07  | 4.23  | 4.71  | 4.95  | 5.18  | 3.64  | 3.21  | 1.89  | 3.97  | 1.89  | 1.96  | 6.24  | 2.07  | 0.71  | 6.18  | 3.44              |
| September.....        | 7.76  | 1.82  | 5.92  | 2.54  | 2.33  | 2.05  | 2.45  | 1.62  | 0.66  | 0.34  | 2.45  | 3.44  | 1.52  | 5.84  | 2.61  | 3.97  | 3.85  | 3.02              |
| October.....          | 1.65  | 0.78  | 1.41  | 2.32  | 2.86  | 2.64  | 2.25  | 4.24  | 1.58  | 1.94  | 4.53  | 1.94  | 2.41  | 0.61  | 7.30  | 4.03  | 5.64  | 2.69              |
| November.....         | 3.71  | 3.42  | 1.95  | 5.09  | 2.26  | 2.30  | 1.01  | 2.02  | 4.75  | 5.73  | 1.65  | 3.83  | 4.09  | 4.07  | 3.63  | 2.48  | 2.34  | 3.21              |
| December.....         | 2.04  | 4.54  | 4.03  | 2.67  | 2.74  | 3.69  | 2.36  | 3.92  | 4.75  | 4.75  | 1.42  | 3.24  | 5.26  | 8.21  | 2.55  | 4.69  | 2.23  | 3.73              |
| Annual sums.....      | 43.26 | 41.03 | 48.05 | 40.63 | 43.14 | 44.16 | 37.34 | 44.26 | 37.45 | 47.75 | 49.94 | 39.40 | 39.49 | 43.00 | 50.06 | 41.86 | 60.04 | 44.34             |
| Monthly averages..... | 3.60  | 3.67  | 4.00  | 3.39  | 3.59  | 3.68  | 3.11  | 3.69  | 3.12  | 3.98  | 4.16  | 3.28  | 3.29  | 3.58  | 4.18  | 3.49  | 5.00  | 3.70              |